

Section II: Other LAER/BACT Determinations

Application No.: C-1010958

Equipment Category – I.C. Engine, Emergency-Compression Ignition

1. GENERAL INFORMATION		DATE: 12/29/2005	
A. MANUFACTURER: Caterpillar			
B. TYPE: Diesel, 4-stroke, turbocharged/aftercooled		C. MODEL: 3516B	
D. STYLE: V-16			
E. APPLICABLE AQMD RULES:			
F. COST: \$ (NA)		SOURCE OF COST DATA:	
G. OPERATING SCHEDULE:		HRS/DAY	DAYS/WK WKS/YR

2. EQUIPMENT INFORMATION		APP. NO.: C-1010958	
A. FUNCTION: Drives electricity generator used for emergency and peaking power. Enables facility to be on SCE interruptible rate schedule.			
B. MAXIMUM HEAT INPUT: 110.1 gph		C. MAXIMUM THROUGHPUT: <<<2848 BHP>>>	
D. BURNER INFORMATION: NO.:		TYPE:	
E. PRIMARY FUEL: Diesel		F. OTHER FUEL: None	
G. OPERATING CONDITIONS: Intermittent			

3. COMPANY INFORMATION		APP. NO.: C-1010958	
A. NAME: Kings County Dept. Public Works		B. SIC CODE:	
C. ADDRESS: 1400 Lacey Blvd.		STATE: CA ZIP:	
CITY: Hanford			
D. CONTACT PERSON: Harry Verheul		E. PHONE NO.: 559-582-3211 x2690	

4. PERMIT INFORMATION		APP. NO.: C-1010958	
A. AGENCY: SJVAPCD		B. APPLICATION TYPE: modification	
C. AGENCY CONTACT PERSON: <<<Brian Clerico>>>		D. PHONE NO.: 559-230-5892	
E. PERMIT TO CONSTRUCT/OPERATE INFORMATION:		P/C NO.: ISSUANCE DATE:	
<input type="checkbox"/> CHECK IF NO P/C		P/O NO.: C1010958 ISSUANCE DATE: 4/10/2001	
F. START-UP DATE: Diesel particulate filter installed January 2002.			

5. EMISSION INFORMATION

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A. PERMIT

- A1. PERMIT LIMIT: Engine must be equipped with turbocharger, aftercooler, positive crankcase ventilation or 90% control of crankcase emissions, <<<oxidation catalyst/particulate filter>>>. Operation is restricted to 614 hours per year. Emission limits (g/bhp-hr): NO_x-5.187, VOC-.0026, CO-.035, PM₁₀-.0116. Fuel must be CARB certified to contain no more than .0015 wt. % sulfur.
- A2. BACT/LAER DETERMINATION: Catalytic particulate filter with ultra low-sulfur (15 wt. ppm) fuel.
- A3. BASIS OF THE BACT/LAER DETERMINATION: SJVAPCD BACT guideline for emergency engine converted to "limited use" status..

B. CONTROL TECHNOLOGY

- B1. MANUFACTURER/SUPPLIER: CleanAir Systems
- B2. TYPE: "PERMIT" catalytic particulate filter
- B3. DESCRIPTION: The engine exhaust passes through six particulate filters arranged in parallel within an acoustic enclosure. Each filter is a porous ceramic cylinder with oxidation catalyst applied to its surface. The catalyst allows oxidation of the carbonaceous fraction of the collected particulate to occur when the filter reaches sufficient temperature (approx. 570F), prolonging filter use before pluggage occurs. The catalyst also oxidizes condensable organics, which are included in total particulate as measured by California methods (impinger catch), and also oxidizes CO and VOC.
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|--|--------------------|--------------------------|
| B4. CONTROL EQUIPMENT PERMIT APPLICATION DATA: | P/C NO.: C-724-8-1 | ISSUANCE DATE: 9/20/2001 |
| | P/O NO.: C-724-8-1 | ISSUANCE DATE: 1/24/2002 |
- | | |
|--|------------|
| B5. WASTE AIR FLOW TO CONTROL EQUIPMENT: | FLOW RATE: |
| ACTUAL CONTAMINANT LOADING: | BLOWER HP: |
- B6. WARRANTY: CleanAir guarantees the following removal efficiencies: PM₁₀-85%, VOC-90%, CO-95%. The 85% PM removal efficiency is based on a weighted average of results at three test loads and does not imply that the 85% removal will necessarily be achieved at all loads.
- B7. PRIMARY POLLUTANTS: NO_x, CO, VOC, PM₁₀
- B8. SECONDARY POLLUTANTS: None
- B9. SPACE REQUIREMENT:
- | | |
|--|-------------|
| B10. LIMITATIONS: CARB recommends this technology for a limited set of engine families (see CARB website) and only for engines producing 0.1 g/hp-hr PM or less. It is recommended that ultra low-sulfur fuel be used (15 ppm maximum sulfur). If the engine operates at low load and the exhaust temperature does not attain 570F, the filter will gradually plug and will need to be cleared by heating to at least 570F while ventilating for at least 2 hours. This can be accomplished by running the engine at sufficiently high load (CARB recommends 40%) or by otherwise heating and ventilating the filter. For an engine that operates only for short periods at low load or idle (e.g., typical emergency engine testing), CARB recommends clearing the filter after every 2 to 4 hours operation. | B11. UNUSED |
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5. EMISSION INFORMATION

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B12. OPERATING HISTORY: The filters were installed late in January 2002, and the engine has been in normal (mainly peaking) use since then. <<<Typically operates 300-400 hrs per year at or near full load. Filters are inspected annually and cleaned manually if necessary.>>>

B13. UNUSED

B14. UNUSED

C. CONTROL EQUIPMENT COSTSC1. CAPITAL COST: ☐ CHECK IF INSTALLATION COST IS INCLUDED IN EQUIPMENT COST

EQUIPMENT: \$ INSTALLATION: \$ (NA) SOURCE OF COST DATA:

C2. ANNUAL OPERATING COST: \$ (NA) SOURCE OF COST DATA:

D. DEMONSTRATION OF COMPLIANCE

D1. STAFF PERFORMING FIELD EVALUATION:

ENGINEER'S NAME: INSPECTOR'S NAME: Ryan Hayashi DATE: 3/13/2003

D2. COMPLIANCE DEMONSTRATION: Engine operated 524 hrs in 2002.

D3. VARIANCE: NO. OF VARIANCES: None DATES:
CAUSES:D4. VIOLATION: NO. OF VIOLATIONS: None DATES:
CAUSES:

D5. MAINTENANCE REQUIREMENTS: See above, B10.

D6. UNUSED

D7. SOURCE TEST/PERFORMANCE DATA RESULTS AND ANALYSIS:

DATE OF SOURCE TEST: January and August 2002 CAPTURE EFFICIENCY:

DESTRUCTION EFFICIENCY: OVERALL EFFICIENCY:

SOURCE TEST/PERFORMANCE DATA:

	Pre-Retrofit (Jan 3-4)			Post-Retrofit (Jan 30-31)			Durability (Aug 27-29)				
	G/BHP-HR			% Removal.			Avg.	% Removal		Avg.	
Load	50%	75%	100%	50%	75%	100%		50%	75%	100%	
Filterable PM	.0636	.0526	.0452	100	97	97		95	95	90	
Condensibles:											
Organic	.0023	.0054	.0075	0	67	80		100	100	60	
Inorganic	.0114	.0091	.0113	80	50	53		50	70	27	
Total PM	.0772	.0671	.0641	96	88	87	89.3	90	92	75	86.5
PPM@15%O2											
NOx	443	351	351	-5	-3	-7		-3	-1	-7	
CO	58	41	40	98	97	97		97	97	97	
VOC	26	19	21	93	93	94		94	96	95	

OPERATING CONDITIONS:

TEST METHODS: PM tests were triplicate one-hour tests, and gaseous emissions tests were triplicate 40-minute tests. CARB Methods 5 (PM) and 100 (gaseous) were used. Average PM removals are based on weighting factors of 0.2, 0.5 and 0.3 at 50, 75 and 100% load, respectively. CARB verifies the filter based on the average PM removal.

6. COMMENTS

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This product (CleanAir Systems PERMIT filter) has been verified by CARB to achieve 85% PM removal based on a weighted average of results at 50, 75 and 100% load (see above, 5D7). CARB restricts its verification of this technology to certain diesel engines (basically, those that produce less than 0.1 g/bhp-hr PM). The filter manufacturer is to evaluate the suitability of the technology in each case based on the engine characteristics and its duty cycle. CARB does not consider the apparent effect of the filter on NOx to be statistically significant.

If the engine is run only at, say, 20% load and can run for only 4 hours before the filter needs to be cleared (see above, B10) and the engine is run two hours at 40% load to clear the filter, the total PM controlled by the filter is about 0.26 lb versus about 21 lb NOx emitted during filter clearing. Therefore, filter clearing by some means other than operating the engine should be required. CleanAir Systems offers to clean the filter if the filter is shipped to them.

An inlet pressure monitor/alarm system should be required so that the operator knows when the filter needs to be cleared.